

The Pending Claims

All of the presently pending claims relate to thin film magnetic recording heads, and recite *structural limitations* that are neither disclosed nor suggested by the prior art. For example, independent claim 11, as amended herein, recites a thin film magnetic recording head having a single thin film coil wrapped around a center pole piece for magnetically energizing a pair of gaps. Similarly, new independent claim 30 recites a thin film magnetic recording head comprising a magnetic coil for magnetically energizing two recording gaps. New independent claim 40 recites a thin film magnetic recording head comprising at least three pole pieces where two of the pole pieces are magnetically coupled to the third pole piece at different positions along the length of the third pole piece. New independent claim 48 recites an improved thin film magnetic recording head comprising, amongst other things, a pole piece that underlies both the front and back halves of a pancake coil. Similarly, new independent claim 51 recites a thin film magnetic recording head comprising at least one pole piece that extends across substantially all of the windings of a pancake coil.

Thus, to summarize, all of the pending independent claims require, at a minimum, either:

- (a) a magnetic coil that can magnetically energize two gaps; or
- (b) two pole pieces that are connected to different positions along the length of a third pole piece; or
- (c) a pole piece that extends across substantially all of the windings of a pancake coil.

With respect to all of the pending claims, it should be understood that use of the terms P_1 , P_2 and P_3 is for shorthand purposes only, and is not intended to limit the claims to the specific embodiments disclosed in the specification. It should also be clear from the written description that the pole pieces can be "magnetically coupled," as this phrased is used in the claims, by way of an integral construction or through post-construction joining using any manufacturing technique known in the art (now or in the future).

The Admitted Prior Art

As shown in Figure 1 of the subject application, which is sketched below as an elevation view (rather than a perspective view), a magnetic write head 20 according to the prior art includes a C-shaped magnetic core 22 having a coil 28 wrapped therearound.

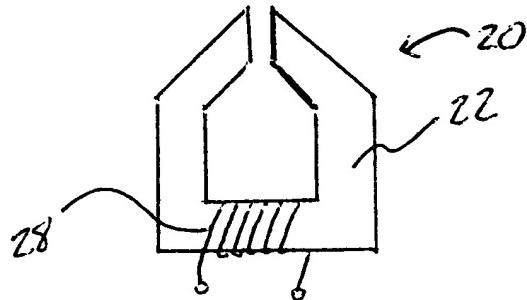


Figure 1 (modified).

Figure 2 of the subject application illustrates how this write head 20 can be constructed using a thin film layering process to yield a thin film head having the following cross-sectional appearance:

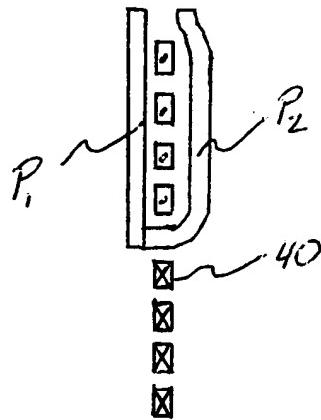


Figure 2(d) (inverted for comparison with Figure 1)

Note that, according to the teachings of the prior art, the cross-sectional shape of the magnetic core for a thin film head is very much like the shape of the magnetic core for a non-thin film head.

Note also that, unlike the present invention, the magnetic coil 40 depicted in Figure 2(d) magnetically energizes only one gap, and the pole pieces P1 and P2 extend across only half of the windings of the magnetic coil 40.

The Jeffers Reference

Figure 2 of U.S. Patent No. 4,908,724 to Jeffers discloses a non-thin film recording head 19 that includes a magnetic core 22 having two coils 32, 34 wrapped therearound. Sketched below is an elevation view (rather than a perspective view) of Figure 2 of Jeffers.

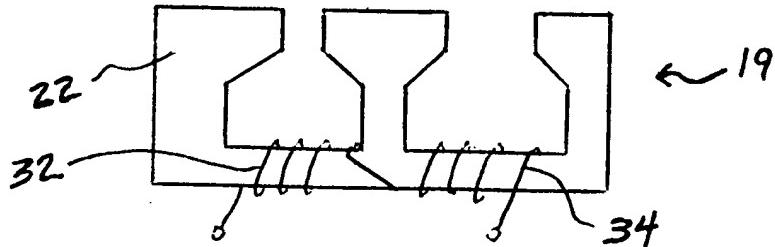
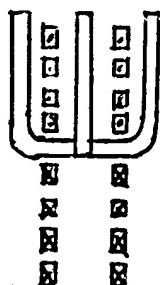


Fig. 2 of Jeffers (modified).

Applicant respectfully traverses the assertion that magnetic heads of the type disclosed by Jeffers, but having a thin film construction, are well known in the art. In fact, Applicant is not aware of any thin film heads having multiple gaps. Applicant also traverses the assertion that it would have been obvious, at the time the present invention was made, to produce the Jeffers head using a thin film construction. However, even if it were obvious to do so, the resulting thin film head would not have the structural limitations that are recited in the presently pending claims.

According to the teachings of the prior art, the cross sectional shape of the magnetic core for a thin film head is very much like the shape of the magnetic core for a non-thin film head. Thus, if one of ordinary skill was motivated to produce the Jeffers head using a thin film construction, the resulting thin film head would have the following cross sectional appearance:



Jeffers Head – Thin Film Construction

Like the write head depicted in Figure 2 of Jeffers, the thin film equivalent depicted above has a similarly shaped magnetic core, as well as two coils wrapped therearound. Unlike the present invention, however, a single magnetic coil is not used to magnetically energize two gaps, none of the pole pieces extend across substantially all of the windings of any single coil, and two of the pole pieces are joined to the same portion, rather than different portions, of a third pole piece. Thus, even if one of ordinary skill would have found it obvious to produce the Jeffers head using a thin film construction, the resulting thin film head would not have all of the structural limitations of any single independent claim.

The Russian Patent

The figures of the cited Russian patent disclose a magnetic core for a recording head that has essentially the same shape as the magnetic core shown in Figure 2 of Jeffers. Two of the figures also depict two coils wrapped around the magnetic core. Thus, these write heads shown in the Russian patent would have the same thin film equivalent as that depicted above for the Jeffers head which, again, fails to disclose the key limitations of the pending independent claims. Although what appears to be Figure 1 of the Russian patent depicts a magnetic core having two gaps that are apparently energized by the same magnetic coil, the drawings and English abstract (and presumably the entire reference) are silent as to how such an arrangement could be implemented using thin film construction techniques.

The Present Invention

According to the teachings of the present invention, the pole piece P_1 shown in Figure 2(d) can be lengthened so as to extend across all of the windings of the magnetic coil, as shown in Figure 3(a) of the subject application. An additional pole piece P_3 can then be laid over the back half of the coil windings and pole piece P_2 , and be magnetically coupled to pole piece P_1 . As a result, a preconditioning gap can be easily and inexpensively added to a thin film magnetic recording head, and the preconditioning gap can be magnetically energized by the same coil as is the write gap. Clearly, the cited references, which don't even pertain to thin film magnetic recording heads, lack any suggestion of this subject matter.

Conclusion

As demonstrated above, the Jeffers and Russian patent references, whether considered alone or in combination, fail to disclose or suggest a thin film magnetic recording head having all of the limitations recited by any single independent claim. Accordingly, the Examiner is respectfully requested to withdraw the earlier rejections and promptly issue a Notice of Allowability for the subject application. In the event, however, that any issues remain outstanding, the Examiner is invited to contact Applicant's representative by phone at the number provided below to expedite any further action that may be required.

Respectfully submitted,



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